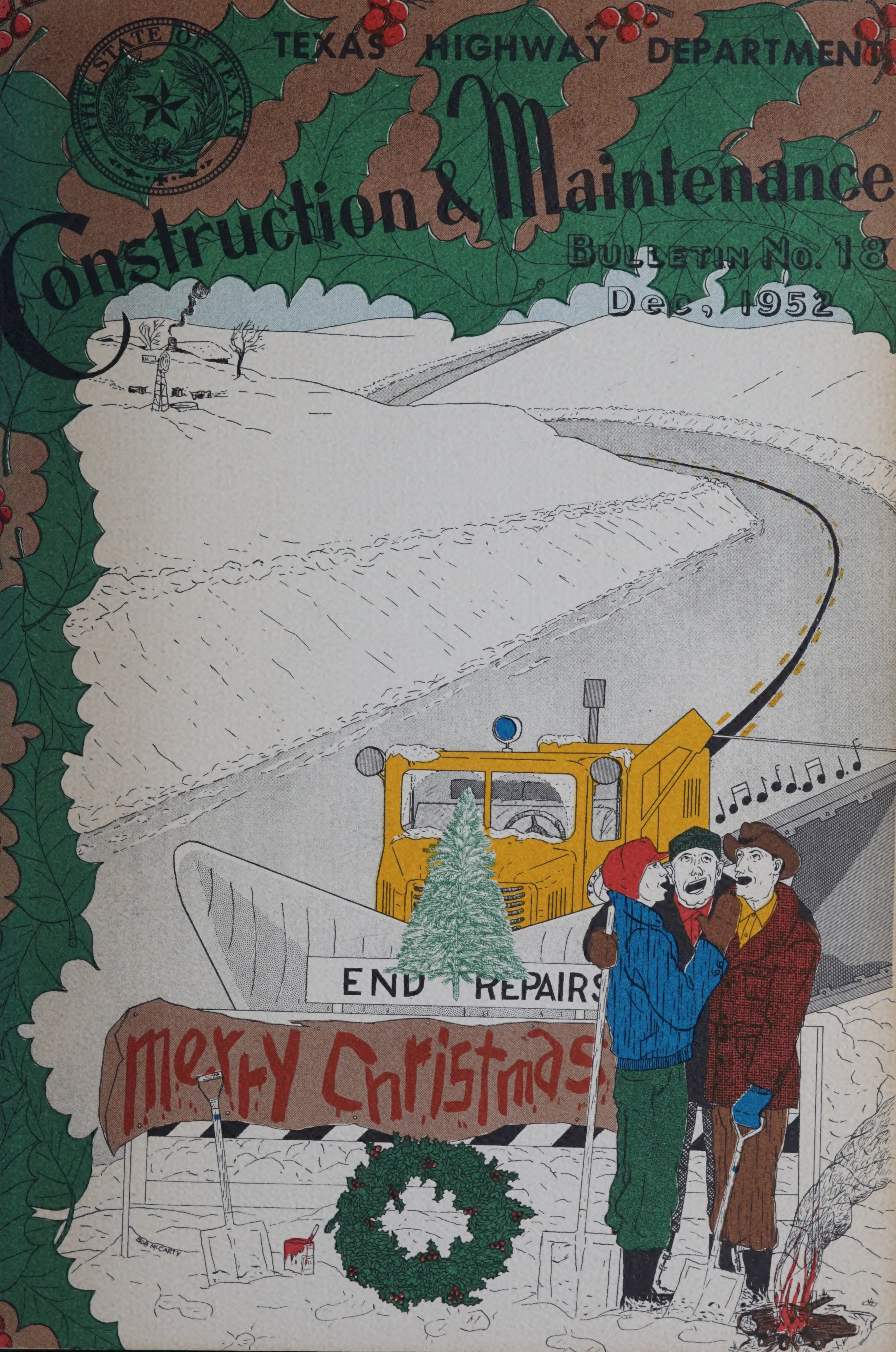
TEXAS HIGHWAY DEPARTMENT

Construction & Maintenance

BULLETIN No. 18

Dec, 1952



Foreword

This bulletin is published for the purpose of presenting practical information applicable to current highway problems. These conclusions and data are not necessarily endorsed by the Highway Department nor are they to be construed as instructions. Employees are invited and urged to submit suggestions and relate experiences which would benefit those engaged in the construction and maintenance of highways.

Photographic services are available and other assistance may be obtained if desired in preparing material for submission. All material and comments should be directed to the Chief Engineer, Construction & Maintenance, Austin, Texas.

Published Jointly by

Maintenance Division	**D- 3**
Equipment & Procurement Division	**D- 4**
Construction Division	**D- 6**
Traffic Services Division	**D-16**

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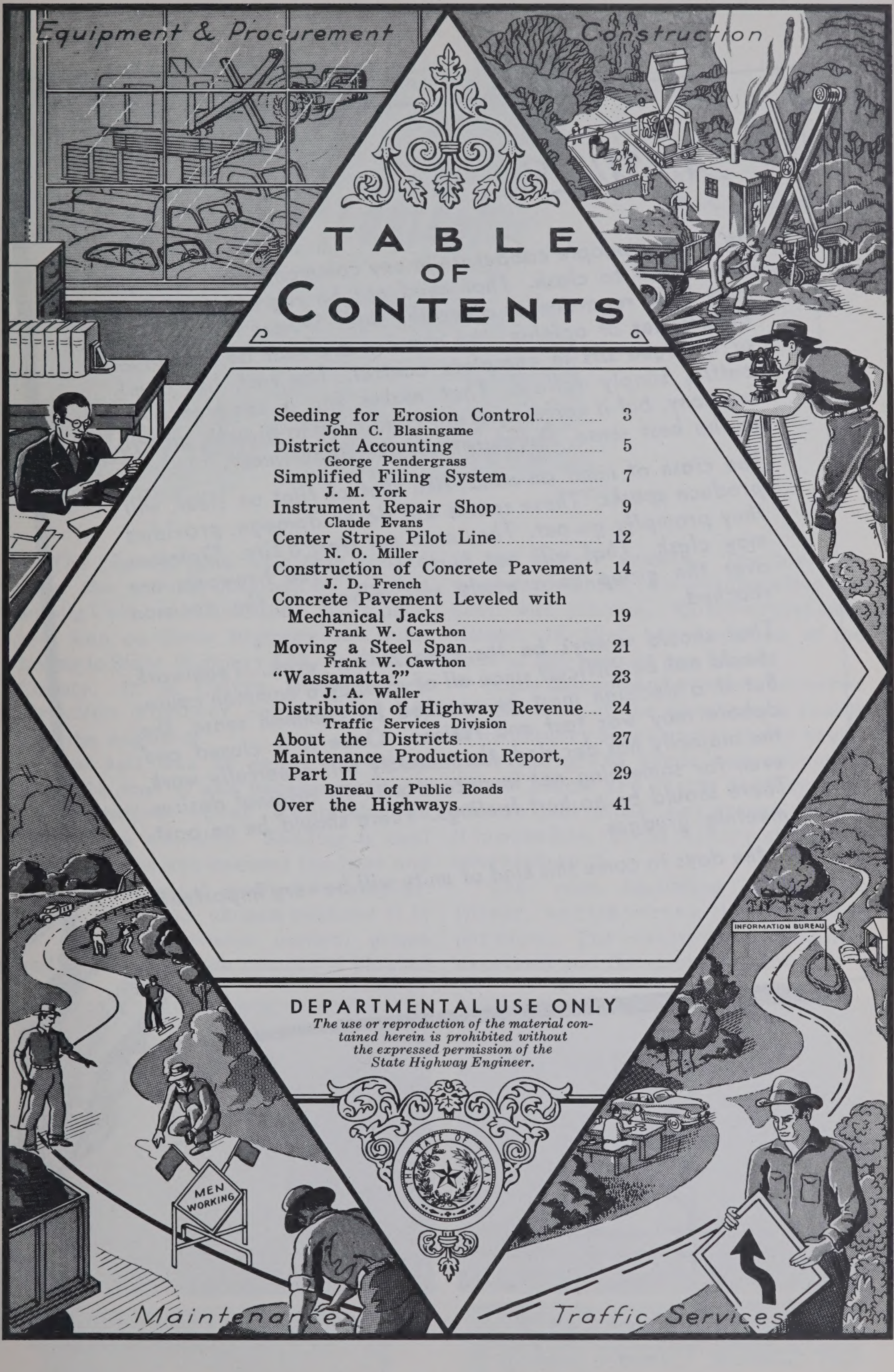
INFORMATION SECTION,
TRAFFIC SERVICES DIVISION
REPRODUCED
OPERATIONS DIVISION
TEXAS HIGHWAY DEPARTMENT
AUSTIN 14, TEXAS



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As We See It

Wherever people cooperate in any common cause, opinions are bound to clash. That need not be regretted. Rather may it be regarded as a healthy sign. Where there are no differences of opinion, the chances are that an individual or a clique sits in complete control. The rest, like dumb cattle, simply follow. That makes for a semblance of harmony, but it certainly is not conducive to growth, growth in the best sense, the growth of the department.

The clash of mind on mind, like that of flint on steel, will produce sparks. These sparks will do no damage, provided they promptly go out. They must not start a fire. Opinions may clash. That will not hurt, if once the fireworks are over the group as a whole will adhere to the decision reached.

That should always be the case in our work. Teamwork should not be difficult since all of us obey a common cause. But if a decision must be reached by common sense, the debate may wax fast and furious. Once it is closed and the majority has decided, the minority will cheerfully work, even for something not in accord with its original desires. There should be no hurt feelings. There should be no post-meeting grudges.

In the days to come this kind of unity will be very important.

Seeding For Erosion Control During Unit One Construction

John C. Blasingame

Senior Landscape Adviser

The photographs with this article show the results obtained by seeding during Unit 1 construction. This project was on State Highway 356 from Irving to State Highway 183, in Dallas County. E. B. Calvin, District Construction Engineer for District 18, was the engineer.

The soil was so sandy and highly erodible that it was necessary to get a vegetative cover established as quickly as possible. Seeding a cool season grass was deemed the best and most economical method to employ. Italian Rye was chosen because it is an excellent erosion control grass and gives very quick results if planted in the proper season. The pictures were made about two months after the seed was planted. Commercial fertilizer, 16-20-0, was applied at the rate of 500 pounds per acre.

Some damage and erosion occurred on the face of the slopes as a result of machinery operating in these areas after the grass seeds had sprouted. These plants are easily destroyed by wheels just after they sprout, and if it is possible, no machinery should be operated on it.

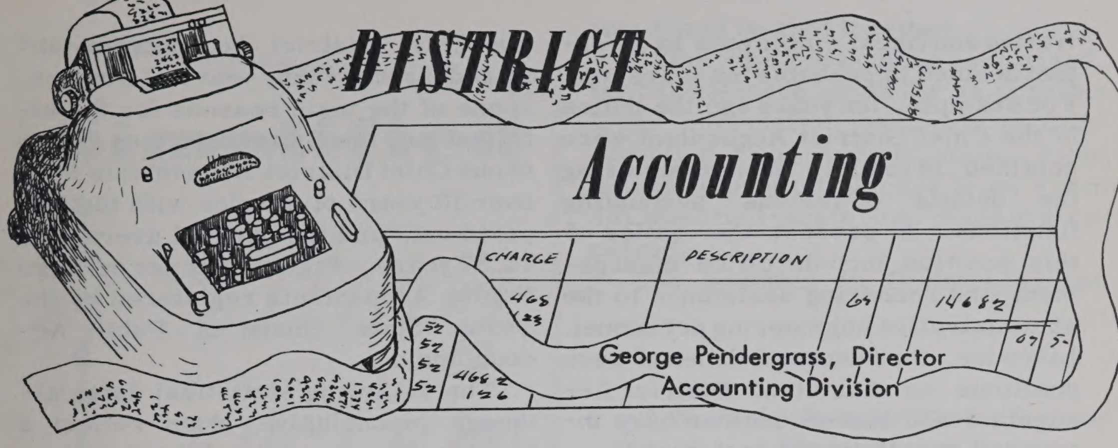
The cost, including seed, fertilizer, and labor ran a little over $30 per acre. The results are considered excellent and the cost very low.

Italian Rye grass on sandy banks of a drainage ditch.

Italian Rye grass on a sandy fill.

Italian Rye grass in a sandy ditch.

Italian Rye grass on a sandy fill.



DISTRICT Accounting

George Pendergrass, Director
Accounting Division

The annual meeting of the Chief District Accountants and other field accounting personnel, was held in Austin on October 16-17, 1952, by D-11, Accounting Division. Representatives from Austin Office Divisions and other State Departments affected by the work performed and processed by the District Offices also attended.

The agenda covered the general phases of accounting and other administrative and fiscal duties handled by the District Offices. These meetings are on a state-wide basis and have been held annually since 1947. The objective is to arrive at a better understanding of common problems by open discussion.

Although the principal function of a district of the Highway Department is the construction and maintenance of highways, the work performed by administrative, fiscal, and clerical employees engaged in all phases of work is an important and necessary adjunct to all operations in the district. The following comments emphasize the part played by accounting employees in the over-all activities of the district.

The Accounting Personnel of the District, headed by the Chief District Accountant, is responsible to the District Engineer for the proper processing and handling of all monetary and allied matters. This includes: (1) payments for salaries and labor, materials and supplies, and expenses; (2) payrolls for equipment rental and stock disbursements; (3) inventories of warehouse stock and equipment; (4) the requisitioning, purchasing, and accounting for all material used in field operations; and (5) all records pertaining to personnel, witholding tax, retirement, group insurance, permits, and so forth.

Proper records of the funds and expenditures of the various projects, budgets, and authorization for all purposes are kept to show the progress of the work performed, and to prevent expenditures being made in excess of the funds appropriated by the State Highway Commission for the particular purpose. A status report showing the current condition of the finances of all phases of the various kinds of construction and maintenance projects and authorizations is prepared monthly for use by the District Engineer and other engineering personnel in administering the fiscal matters of the district.

The tremendous expansion of the state road system during the past ten years has increased the work volume and responsibilities of the administrative and fiscal employees to an extent deemed improbable ten years ago. For example, ten years ago the duties of the Chief District Accountant were confined primarily to administering the details of various accounting functions. At present the duties of this position include office management and rendering assistance to the administrative engineering personnel. Likewise, the responsibilities of such positions as Assistant District Accountant and Warehouseman have increased greatly in the last decade.

The experience and knowledge of the Chief District Accountants, acquired through many years of service, is one of the main reasons for the efficiency of the District Offices. Two of our Chief District Accountants have over 30 years of service with the Department, and the general average is 18.37 years. Eighty-four per cent are Public Accountants registered by the Texas State Board of Public Accountancy.

The following statistical data, although inconclusive, does reflect a trend in the expansion of the Districts during the past decade.

	FISCAL YEAR	
	1942	1952
CONSTRUCTION-Cash Disbursements	$34,643,320	$88,960,750
MAINTENANCE-Cash Disbursements	$11,570,266	$33,281,112
Mileage under Maintenance on Aug. 31	23,997	41,254
Warehouse Stock Inventory on Aug. 31	$ 2,040,668	$ 6,592,696
Warehouse Stock Disbursements	$ 3,848,390	$14,882,922
Equipment Rental	$ 2,467,034	$ 8,107,958
Investment in Highway Equipment on 8/31		
(4,911 pieces)	$ 1,841,528	
(8,411 pieces)		$ 8,018,848
Average Number of Employees per Month:		
District Office-Accounting Employees	177	247
District Shop-Salaried Employees	98	135
Hourly Employees	349	454
Field Maintenance-Salaried Employees	489	411
Hourly Employees	4,510	4,582
Field Construction-Salaried Employees	1,500	2,229
Hourly Employees	-	186

* * *

Recently, when a joint of concrete pipe which was supposed to be reinforced was accidentally broken on one of our construction jobs, it was found that it contained no steel.

C. H. Brown, District Construction Engineer, and A. E. Johnson, Sr. Resident Engineer, hit upon the idea of checking the remaining joints of pipe for absence of steel by using a "War Surplus" mine detector.

By so doing, they found another joint of pipe which had already been installed and which contained no steel.

Simplified filing system

J. M. York, Assistant District Engineer
District 11

District 11 has found a simplified method of filing final plans and job files.

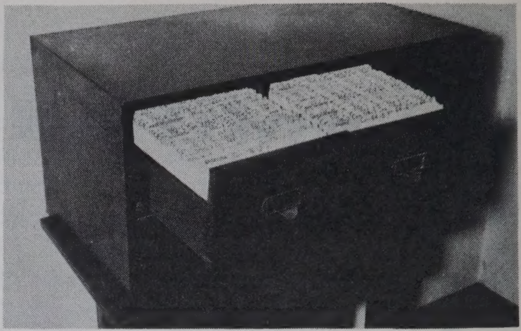
District 11 has developed a system of filing job plans and job correspondence which may be of some interest to other Districts. This system was not invented all at once but was developed over a long period of time and has worked satisfactorily. The development started from a card filing system; a card was made for each separate job number with all pertinent data shown which would quickly identify the job. These cards were filed by county behind control and section numbers. A sample card is enclosed marked Exhibit "A."

Plans and correspondence on all jobs were formerly kept in a more or less haphazard manner by county and project number. As more projects were developed, it became apparent that a better system for filing job plans and correspondence would be necessary. The idea was conceived that if this card file could be made into an index for the final plans and job correspondence files, then the whole system could be tied together.

At the time a new job is authorized, the card is made up as far as possible from information available on Construction Fund Authorization. Final data is entered on the card from Form 431 when half-scale final plans are received.

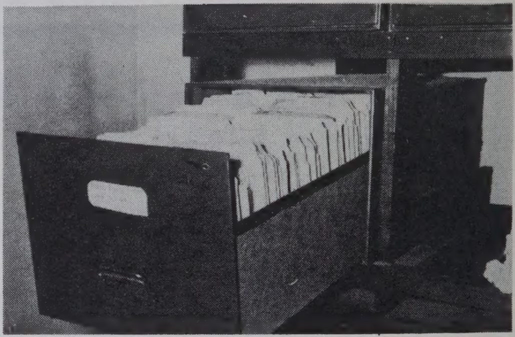
The counties in District 11 are listed alphabetically and each county is given a prefix number, the first county is 100, the second 200, and so forth, through the nine counties. Bound sets of plans are numbered consecutively behind each respective county. When a set of final plans is given a number, this same number is placed on the corresponding card and also on all files pertaining to this project. All small maintenance projects, where loose leaf plans are received instead of bound sets, are accumulated in the first numbered book of each county, that is Book 100, 200, or whichever it is, with each set of plans being given a page number. The corresponding card and job file for loose leaf plans are numbered with the book number and page number so that plans and job file can be easily located. After a set of final plans, the corresponding card, and project files have been given a number, the card is placed behind its control and section master card list in the District Office. The final plans are also kept in the District Office while all files on the project are transferred to the District Records Room where transfer files are set up in numerical order by county and the files are placed in the permanent records consecutively by their number.

A District control-section map is used as a key to the card file. When final plans or correspondence are desired on a completed project, the control and section are located on the map. Looking behind the county in which the project is located, we select the control and section master card. We then locate the card for the desired project which shows the number given the final plans and job files, both of which can be readily found.

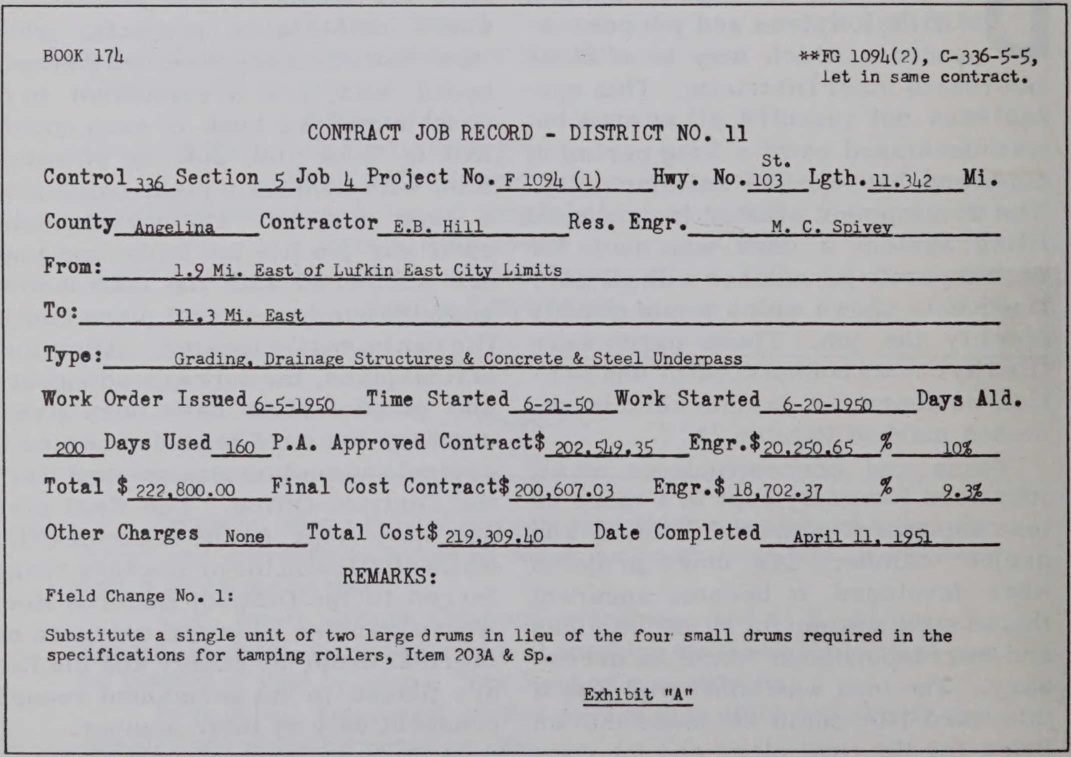


Card index file.

Final plans file.



Permanent files in record room.



BOOK 174

**FG 1094(2), C-336-5-5,
let in same contract.

CONTRACT JOB RECORD - DISTRICT NO. 11

Control 336 Section 5 Job 4 Project No. F 1094 (1) Hwy. No. St. 103 Lgth. 11.342 Mi.

County Angelina Contractor E.B. Hill Res. Engr. M. C. Spivey

From: 1.9 Mi. East of Lufkin East City Limits

To: 11.3 Mi. East

Type: Grading, Drainage Structures & Concrete & Steel Underpass

Work Order Issued 6-5-1950 Time Started 6-21-50 Work Started 6-20-1950 Days Ald. 200 Days Used 160 P.A. Approved Contract$ 202,549.35 Engr.$ 20,250.65 % 10%

Total $ 222,800.00 Final Cost Contract$ 200,607.03 Engr.$ 18,702.37 % 9.3%

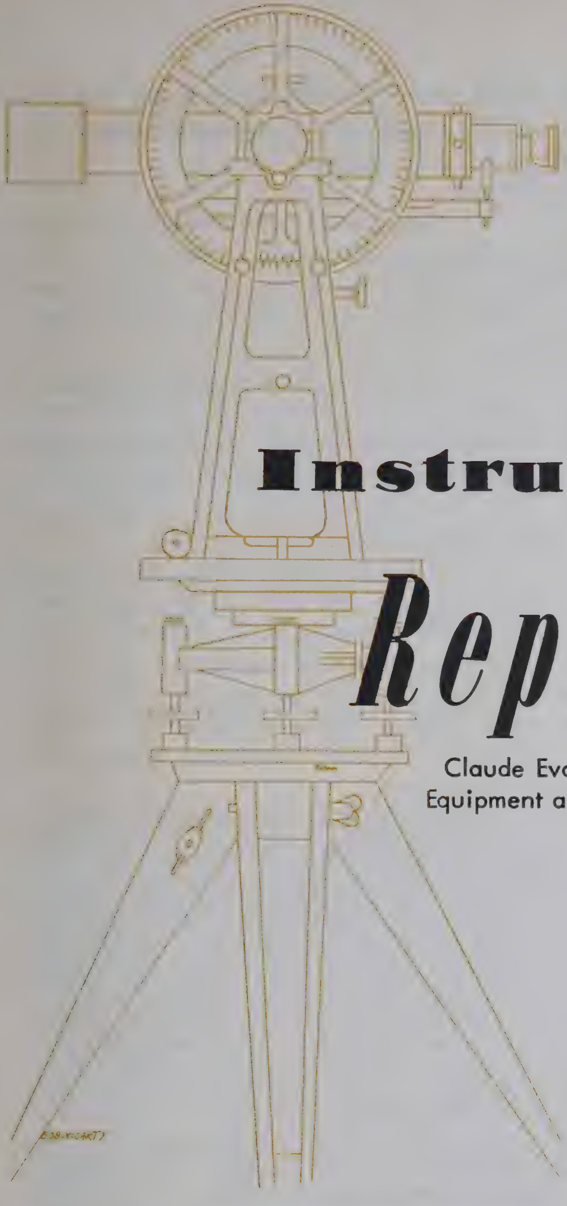
Other Charges None Total Cost$ 219,309.40 Date Completed April 11, 1951

REMARKS:

Field Change No. 1:

Substitute a single unit of two large drums in lieu of the four small drums required in the specifications for tamping rollers, Item 203A & Sp.

Exhibit "A"



Instrument Repair Shop

Claude Evans, Senior Technician
Equipment and Procurement Division

The Department has over 500 sets of levels and transits which the Instrument Repair Shop is responsible for keeping in good repair. This shop has been in existence for approximately seventeen years and was once located in the main building in Austin. At the present time it occupies space at Camp R. M. Hubbard which was designed especially for this type of repair work. This shop also maintains and repairs office machines for the main building and, in a great number of cases, for the field.

At the present time this shop is turning out about 300 transit and level repair jobs per year. Actually, we should thoroughly clean and adjust all instruments owned by the Department at least once each year. In some cases the instruments should be cleaned and adjusted more often because of the extremely dusty conditions where these are used. We believe that if the Resident Engineers and Instrument Men will take advantage of this free service, the life of these units can be extended indefinitely.

Some of the instruments have fine threads on the tripods and shoe plates. On all of these and all of the badly worn ones the tripods and plates are being changed over to standard three and one-half by eight thread. This saves the instrument man the embarrassment of having his instrument fall off the tripod when he picks it up to move to a new location.

Repair bench with technicians Milton Sweet, Edward Goertz, and Claude Evans at work.

It may be well to describe here just what is done to a transit or level when it reaches the repair shop. It is first examined thoroughly to determine the necessary repairs; then it is disassembled and put in a cleaning solution to get the dirt out of the paint and screw threads. If the finish is bad, the paint is removed and it is refinished. After cleaning or refinishing, the parts are refitted as closely as possible for good operation, then the instrument is assembled and adjusted. Two adjustments are necessary to "settle down" the instruments after all screws have been removed and replaced. Each adjustment is permitted to "settle down" about 24 hours.

Ordinarily we can repair and return an instrument to the District within two weeks; but in some cases, especially where the instrument has been damaged by accident and has to be sent to the factory, it takes from 90 to 180 days to get it back in use.

There are some things the instrument man can do to prolong the life of his instruments. Any time there is anything wrong with a transit or level, it should be repaired without delay because it has been our experience in nearly every case that the cost of repair increases by the hour after injury if use is continued.

Listed below are a few suggestions on what to avoid. These have been issued from this office before, but are still thought to be of some value.

Avoid:

1. Continuous use of a transit after a grain of sand has found its way to, and lodged between, the vernier and limb. This is a $50 factory repair job.

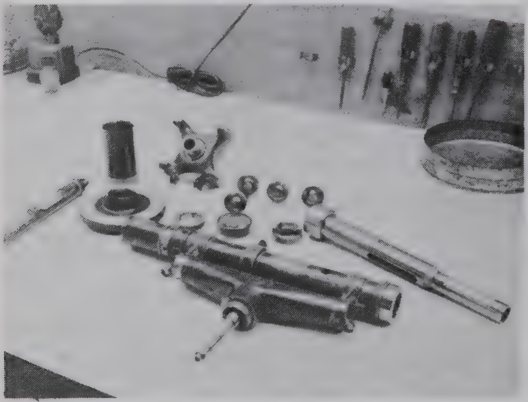
2. The use of sewing machine oil which dries rapidly, but not before it has gathered dust which adheres to the clamps and spindles forming an abrasive that "grinds out" the accuracy of the instrument.

3. Excess tightening and uneven tightening of screws. This puts back into the instrument some of the stresses that the manufacturer spent so much time taking out by heat treating. These stresses cause the instrument to "crawl" with the changes in temperature.

4. Using the instrument without sun shade or allowing the sun to shine directly into the objective lens. This causes the balsam separating the crown and flint glasses to deteriorate.

5. Using excess pressure when wiping dust off the lenses or the use of hard or coarse cloth or paper for the purpose. A camel's hair brush or one similar should be used.

6. Thrusting or plunging the tripod leg points into the ground while instrument is attached.



LEVEL, DISASSEMBLED - Note the extent to which instruments are taken apart.

Two transits ready to be reassembled and adjusted.

7. Improper carrying of instrument while attached to tripod.

8. Forcing the tangent screws and leveling screws when they are clogged with sand.

9. Not protecting the instrument while it is being hauled over rough road or terrain.

10. Riding in car or truck with one's feet resting on instrument box.

11. Using hammer and chisel to unscrew instrument from tripod.

12. Using graphite of any kind for lubricant.

13. Allowing instrument to get wet and not drying it at once.

14. Locating an instrument and leaving it unattended:

   A. In high wind.
   B. Among many workmen.
   C. Where pedestrians or vehicles are passing.
   D. In pastures or highways where cattle or other animals are free to roam.

It should be a "must" when sending an instrument in for repair to send the tripod too, because often it is necessary to repair the tripod and, also, if the instrument is changed to three and one-half by eight thread, the tripod has to be changed also.

Natural wear is abuse if it is allowed to go long enough to gather excess dirt, thereby increasing the rapidity of wear.

We are of the opinion that if these simple rules are followed the engineer will benefit by the accuracy of his instrument thereby insuring a longer life which will automatically reduce maintenance cost.

COLLIMATOR – used in adjusting transits and levels. The distance through the optics between the collimator and the level on the adjusting post amount to approximately 600 yards in the field.

Center Stripe Pilot Line

N.O. Miller
Senior Maintenance Foreman
District 24

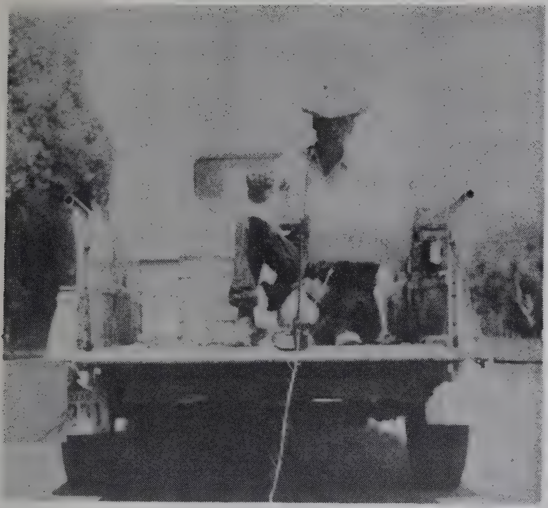
Several methods of placing pilot lines for center striping have been tried in District 24 with varying degrees of success; however, the following procedure has proved to be the fastest and most satisfactory to date:

1. Where an existing striped road is to be sealed, a bottle top is nailed to and on top of the existing center points. If the tops are not flattened, they will become visible after the new seal coat has cured out.

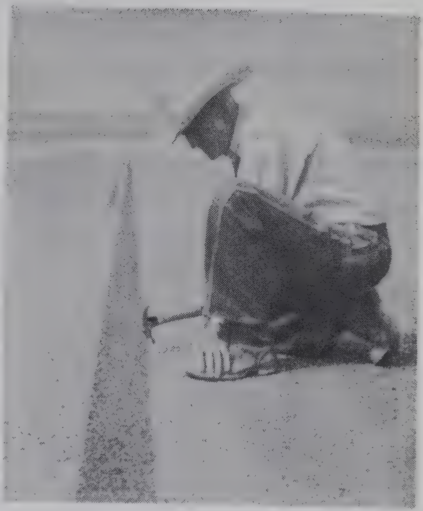
2. One man paints the top of a right-of-way fence post to mark the beginning and end of the barrier stripes.

3. After the seal coat has cured sufficiently, the pilot line is placed by unrolling binder twine from a spool mounted in the bed of a pickup. The spool is mounted as shown in Photograph No. 1 and holds about 10,000 feet of binder twine. Two men follow the pickup on foot and nail down the twine from center points. The twine is placed two and one-half inches from the center points so the asphalt or paint will not cover the string. The pilot line machine is moved along behind the two men nailing the line, another man follows the pilot line machine and releases the string line. As soon as the 10,000 feet or less have been placed, the twine is rewound and the pickup moves ahead to repeat the operation.

This procedure requires seven men, two on the pickup, two nailing string line, one on the pilot line machine, one pulling nails, and one in a following pickup or truck mixing paint for the pilot line machine. In a normal day we lay from ten to fourteen miles of pilot line with this method.



Spool mounted on pickup truck.



Raising center points before sealing.

Winding twine prior to moving ahead.

Pilot line machine two and one-half inches off string line.

Construction of
CONCRETE PAVEMENT

J. D. French, Supervising Construction Engineer
Construction Division

This picture story shows some of the more important steps in constructing concrete pavement. These pictures are typical views from various projects over the entire state.

Bulk cement batching bins.

Aggregate batching plant.

Setting forms - This is a very important operation, as the form line not only controls riding surface, but also depth of the finished pavement.

Cutting subgrade with a subgrade machine.

The final cut is made with the subgrade planer.

Finished subgrade.

Dowel bar installing device.

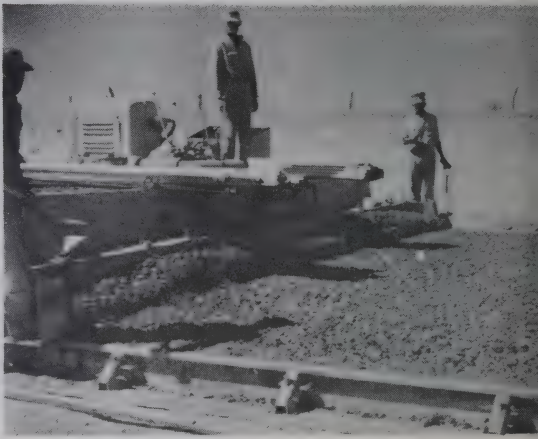
"Star Lug" - load transmission.

Corrugated metal joint about to be vibrated in place.

Dual drum paver - They are big, but so is Texas.

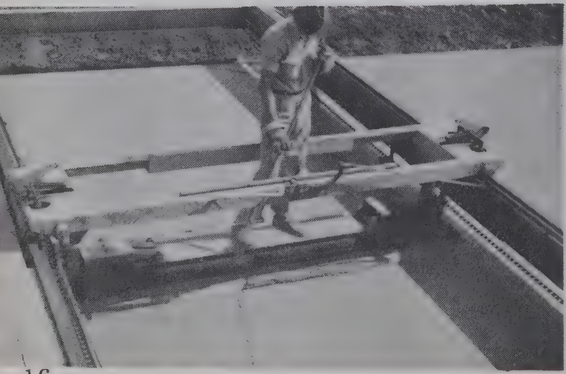
Placing a batch of concrete.

Spreading concrete with the machine.

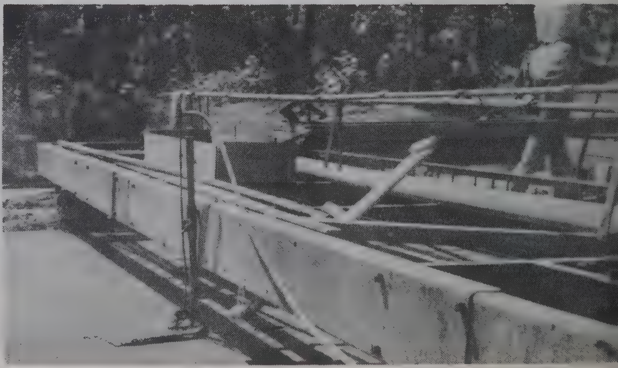


Finishing machine.

Longitudinal float - "Bull float" to the industry.



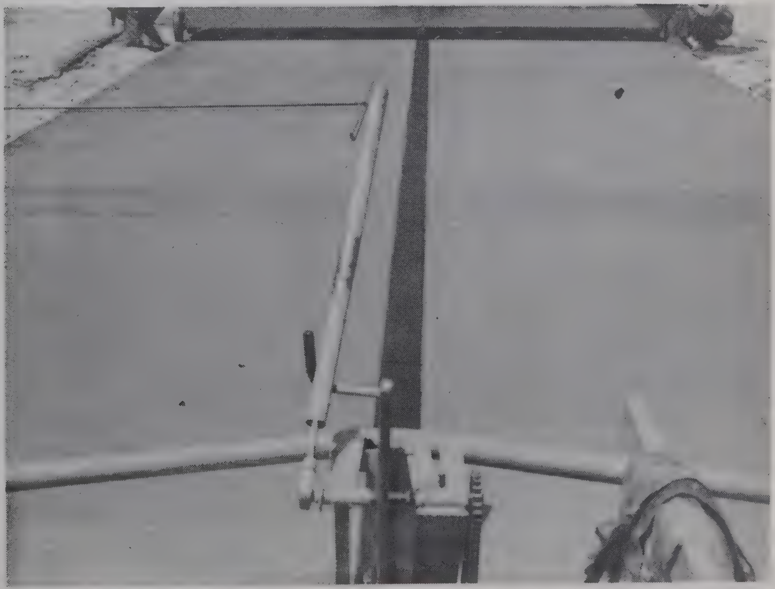
Special longitudinal joint cutting device.



Checking the surface with steel straight edges.

Belting the surface.

The traffic strip - The public sees this; let's keep it neat and straight.



The first step of the depth test – The inspector is locating a metal plate he has placed on the subgrade.

The second step of the depth test – Working from a bridge, the inspector pushes a rod through the concrete until it touches the metal plate. He marks the surface of the concrete on the rod, withdraws the rod, and measures to the nearest one-eighth inch. Simple, isn't it?

Concrete Pavement Leveled with Mechanical Jacks

Frank W. Cawthon, District Engineer
District 18

This district has leveled eleven miles of one-lane concrete pavement by using railroad-type step jacks to raise low or tilted slabs to grade. Due to the unusual methods used, and the good results attained, the Maintenance Division requested a description of the work performed.

This eleven-mile section of road between Royse City and State 205 in Rockwall County was built by the County in 1923 or 1924 and has now been added to our highway system as F. M. 548. It consisted of an eight-foot concrete slab with gravel passing sites at intervals. These old concrete slabs were badly out of section, with many of them tilted as much as eight to ten inches. Improvement was necessary to bring the road to a satisfactory condition for maintenance.

The proposed improvement design called for a 24-foot base width and an eighteen-foot surface. Widening the base by placing an eight-foot and a three-foot strip of rock adjacent to the slab, and placing an asphaltic surface were set up for contract. Ahead of the contract, maintenance forces supervised by Grover Green, District Maintenance Engineer, performed the leveling job reported here.

On the badly tilted sections, the dirt shoulders were bladed away from the low side of the concrete slab. Railroad-type step jacks were then set up and operated as shown in the pictures. After a section of the slab was raised with the jacks, screenings from a local rock source were placed and tamped under the slab as far back as conditions would permit. The jacks were then removed and carried forward to the next section to be raised.

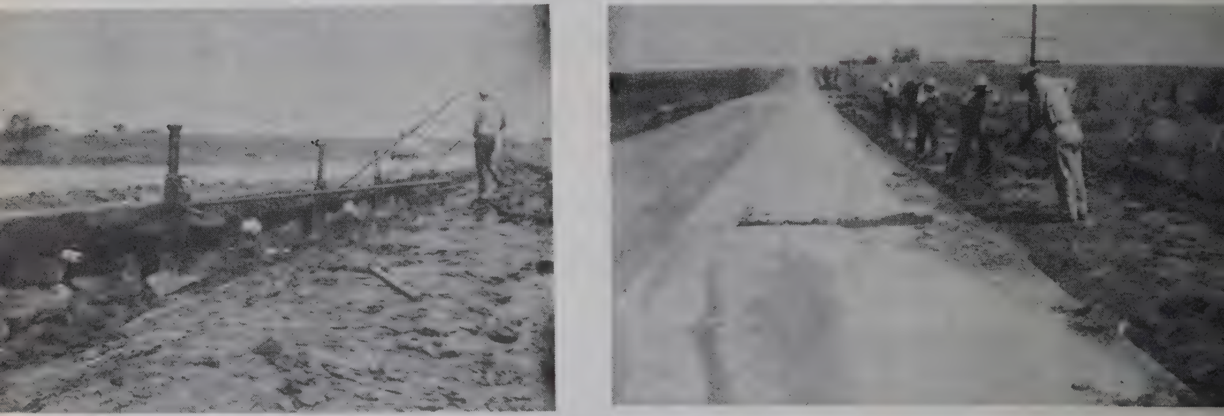
Directly following the slab-raising operation, slurry was pumped through previously drilled holes in the pavement to fill all voids under the raised slab. At the outset a very fine silt was used to make the slurry, but when difficulties arose in locating sufficient acceptable silt, it was discovered through trial that very fine screenings from a local rock source worked better than the silt, so these rock screenings were used thereafter. The slurry was composed of the following mixture which, we understand, has also been used successfully in other districts.

Fine Silt or Fine Rock Screenings --------- 1 C. Y.
Cutback Asphalt (RC-2) ----------------- 18 Gal.
Portland Cement ---------------------- 2 1/2 Sks.
Sufficient water to produce workable mixture.

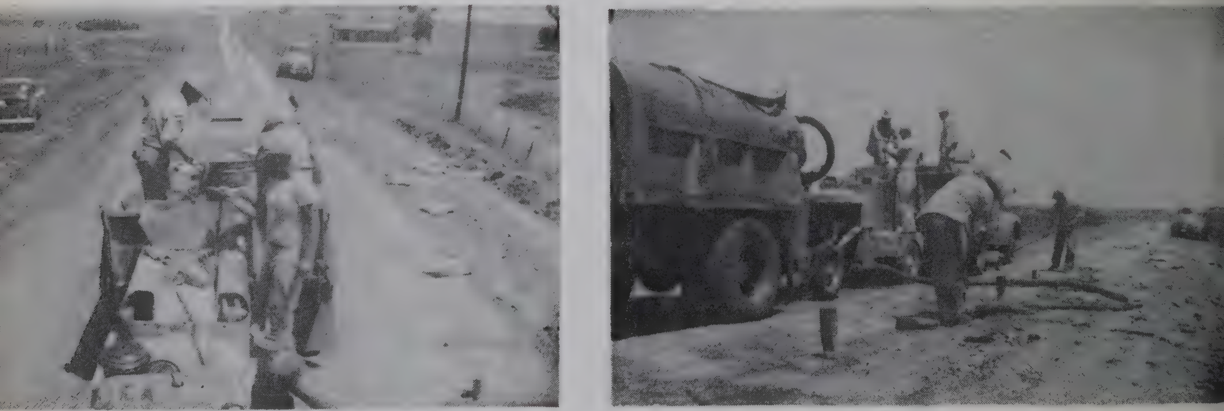
In raising the slab, 538 cubic yards of slurry were used and the unit cost amounted to $17.14 per cubic yard. Approximately 9,000 linear feet of slab were raised.

This work has greatly improved the ridability of the road and has made it possible to secure a much better full-crown base section.

The dirt shoulder is bladed from the side of the concrete slab to be raised.

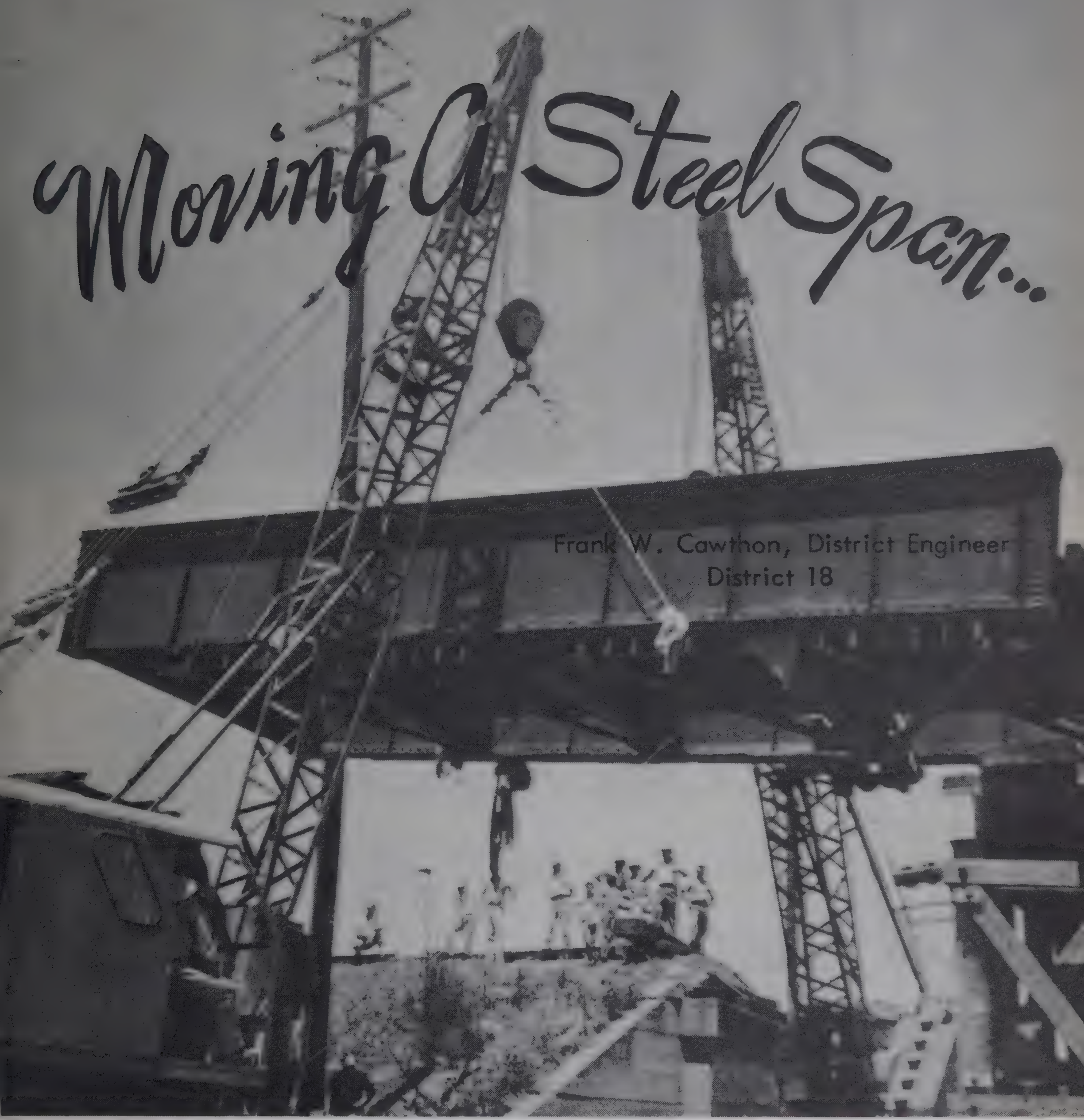


Railroad-type step jacks raise the slab to grade. Some slabs were raised as much as ten inches.



After screenings were tamped as far as possible under the raised slab, slurry was pumped under the slab to fill all voids.

Moving A Steel Span...



Frank W. Cawthon, District Engineer
District 18

Recently in the construction of a four lane underpass on U. S. 175 within the city limits of Dallas, the existing 40-foot girder was picked up by two cranes and walked to the shoo-fly location, which was too far removed from the main line to permit the usual move with a standard railroad wrecker.

The through girder is a rather substantial structure, having been on the main line tracks of the T. & P. Railway and the T. & N. O. Railway to Sherman. The operation closed the railway main line four hours. Highway traffic was rerouted over two detours for three and one-half hours. Rail traffic is very heavy at this crossing, and highway traffic is approximately 15, 000 V. P. D.

Two motor cranes were used in the operation.

Uvalde Construction Company and John T. Leslie were the contractors.

E. B. Calvin was in charge of the job for the State.

. . . Last car over the old structure.

Motor cranes in position preparatory to lift.

Shoo-fly trestle ready for steel span.

. . . Just prior to final position.

This 40-foot girder was moved from the main line T&NO to shoo-fly trestle.

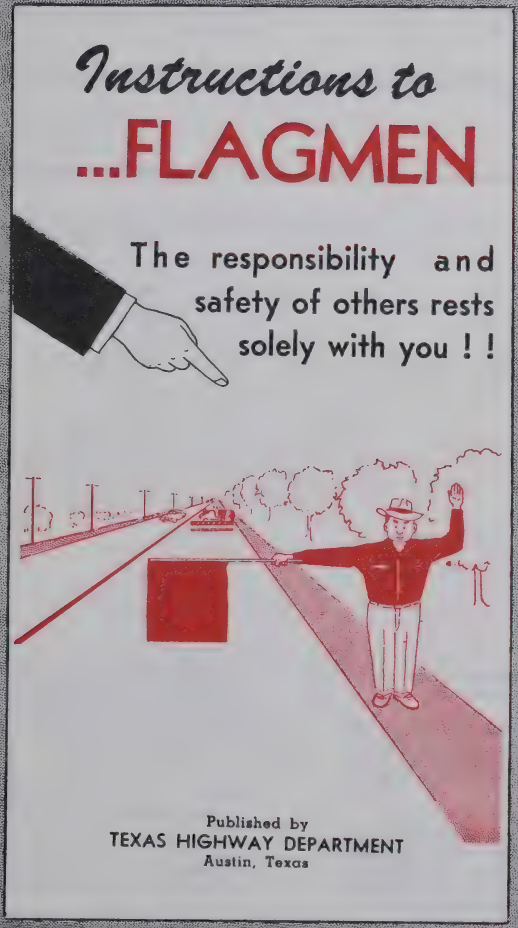
"Wassamatta ?"

J.A. Waller, Engineer, Construction and Maintenance

During a recent instructors school the members were given manuals, bulletins, and specifications, along with the folder on "Flagging Procedure." For some unknown reason we asked those who had never seen the folder to kindly hold up their hands--and lo and behold --approximately one-half indicated they had never seen the folder before.

We wonder how many flagmen would hold up their hands if asked this same question.

An article on this pamphlet appeared in Bulletin No. 8. These pamphlets are still available by writing D-16 in Austin.



Instructions to

...FLAGMEN

The responsibility and safety of others rests solely with you ! !

Published by
TEXAS HIGHWAY DEPARTMENT
Austin, Texas

SOURCE OF THE HIGHWAY DOLLAR ooo

TRAFFIC SERVICES DIVISION

The principal source of highway income is from gasoline taxes and vehicle registration fees. These funds are not earmarked for specific purposes and may be used at the discretion of the Highway Commission in defraying the costs of construction, maintenance, operation and administration of the highway system.

Federal funds are obtained through the Bureau of Public Roads. These federal funds are prorated among states for the construction only of highways which meet certain prescribed standards. To qualify, a state must match federal funds dollar for dollar.

The 51st Legislature in 1949 passed the Senate Bill Number 287 appropriating 15 million dollars annually to be used at the rate of one and a quarter million dollars each month for the purpose of building farm to market roads. No other highway funds are received from general revenues.

Monies received from certificates of title when vehicles change ownership in this state, along with the funds received from the sale of overdimensional and overweight permits, become a part of the general highway fund.

DIVIDING THE HIGHWAY DOLLAR ooo

. . . for all practical purposes, the highway dollar is divided five different ways for spending.

CONSTRUCTION consumes the largest portion. This does not necessarily mean building new highways, but includes major repairs, relocation of roads, widening bridges, and other extensive highway rehabilitation projects.

MAINTENANCE requirement of the highway dollar is spent for the upkeep and maintenance of the entire highway system. Also included in this fund are the various traffic services, including highway signs and markings, roadside improvement and soil erosion control.

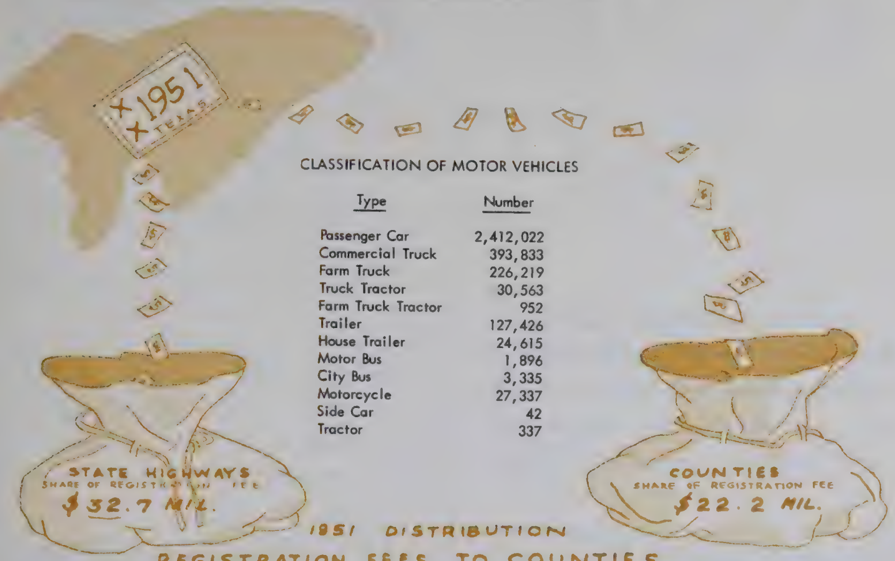
ADMINISTRATION funds include laboratory projects for research on materials and soils. Operation expenses are also included in the administration funds for maintaining buildings, supplies and office equipment along with personnel salaries.

THE DEPARTMENT OF PUBLIC SAFETY receives a portion of the general highway fund by a special legislative act passed by each session of the Legislature.

EQUIPMENT costs include all types and kinds of equipment, including materials and supplies necessary for the construction, maintenance, and operation of the entire highway system.

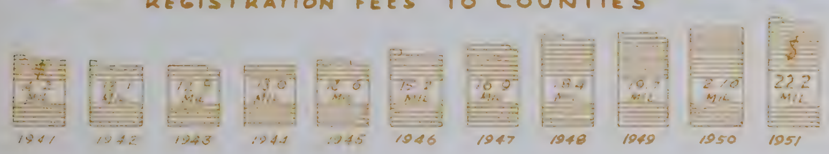
BREAKDOWN OF REGISTRATION FEE ooo

BASED ON REGISTRATION YEAR APRIL 1, 1951 THROUGH MARCH 31, 1952



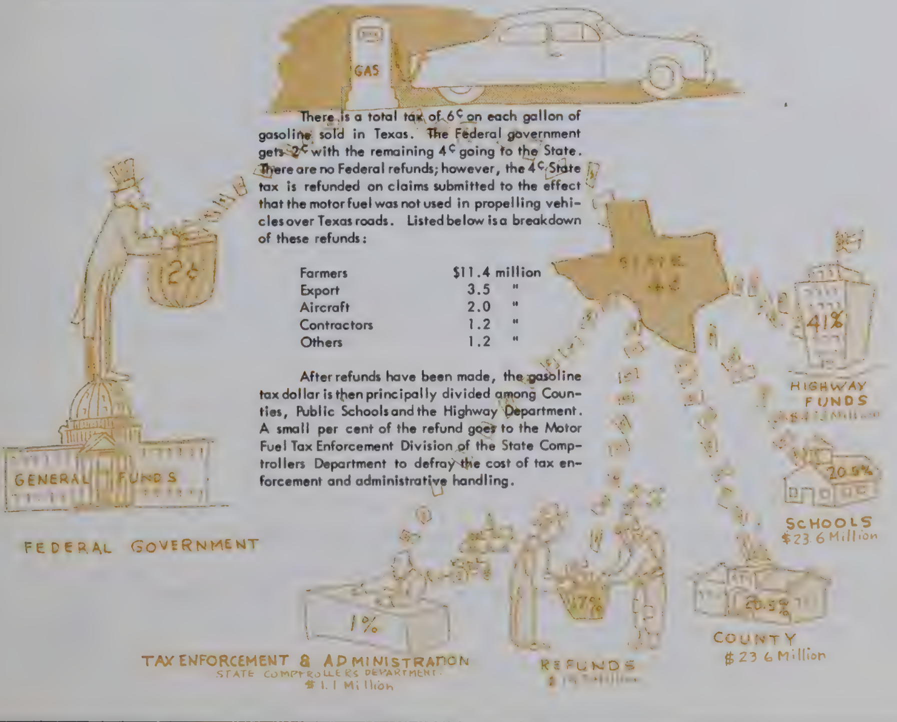
CLASSIFICATION OF MOTOR VEHICLES

Type	Number
Passenger Car	2,412,022
Commercial Truck	393,833
Farm Truck	226,219
Truck Tractor	30,563
Farm Truck Tractor	952
Trailer	127,426
House Trailer	24,615
Motor Bus	1,896
City Bus	3,335
Motorcycle	27,337
Side Car	42
Tractor	337



BREAKDOWN OF MOTOR FUEL TAX

BASED ON FISCAL YEAR SEPTEMBER 1, 1950 THROUGH AUGUST 31, 1951



There is a total tax of 6¢ on each gallon of gasoline sold in Texas. The Federal government gets 2¢ with the remaining 4¢ going to the State. There are no Federal refunds; however, the 4¢ State tax is refunded on claims submitted to the effect that the motor fuel was not used in propelling vehicles over Texas roads. Listed below is a breakdown of these refunds:

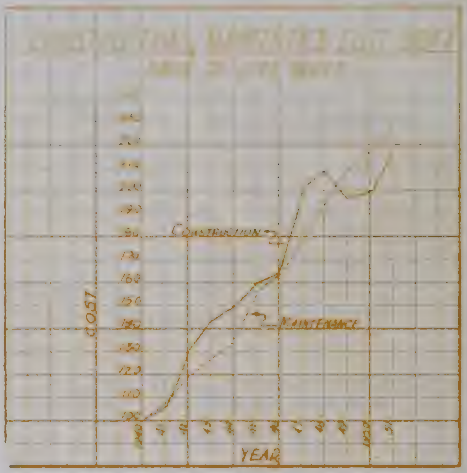
Farmers	$11.4 million
Export	3.5 "
Aircraft	2.0 "
Contractors	1.2 "
Others	1.2 "

After refunds have been made, the gasoline tax dollar is then principally divided among Counties, Public Schools and the Highway Department. A small per cent of the refund goes to the Motor Fuel Tax Enforcement Division of the State Comptrollers Department to defray the cost of tax enforcement and administrative handling.

INFLATION HAS SHRUNK THE HIGHWAY DOLLAR ○ ○ ○

The continual spiral of inflation has progressively shrunk the highway dollar. Construction and maintenance costs have doubled in the last decade. In many cases, the price of certain items has increased over 150 per cent. The only item which is purchased at approximately the prewar level is the technical and administrative labor of highway employees. Today's deflated highway dollar can be counteracted by increasing its volume. It is worth only 45¢; consequently, to purchase a full dollar's worth of highway, it will be necessary to add 54¢ to each highway dollar.

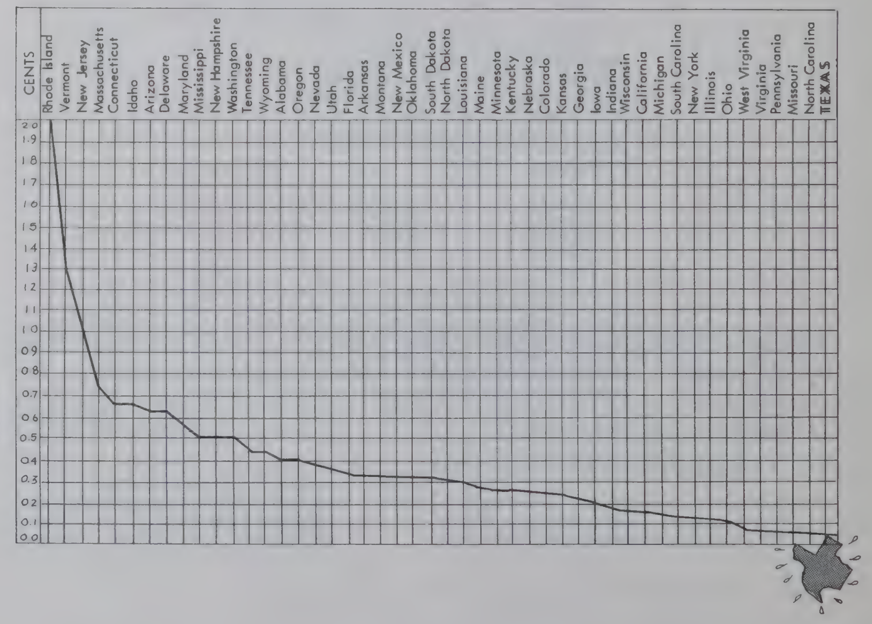
The already thinly-spread highway dollar continues to shrink -- as its needs increase.



TEXAS AT THE BOTTOM OF THE 48 !

MOTOR FUEL TAX VS HIGHWAY MILEAGE

Comparison of gasoline tax based on 500 mile units of state-maintained highways.



ABOUT THE DISTRICTS

DISTRICT 20 HOT MIX ASPHALTIC CONCRETE SCHOOL

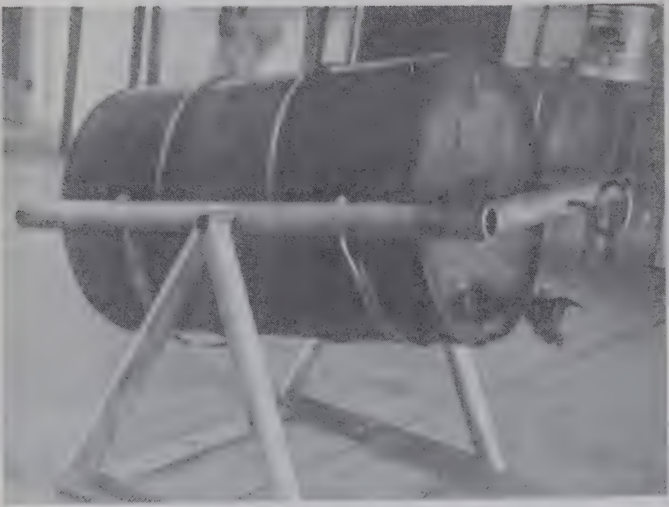
District 20 has completed a Hot Mix Asphaltic Concrete School under the supervision of C. H. Brown, District Construction Engineer, with the assistance of Leo Gunter, Chief Inspector, and W. N. Dudley, Resident Inspector.

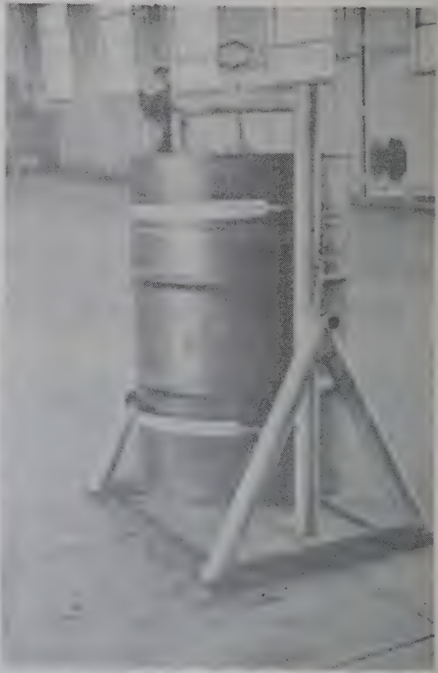
Brown attended the first school in Austin conducted by D-6 last September. Our District School was held from September 29 through October 3, and on October 20, 1952.

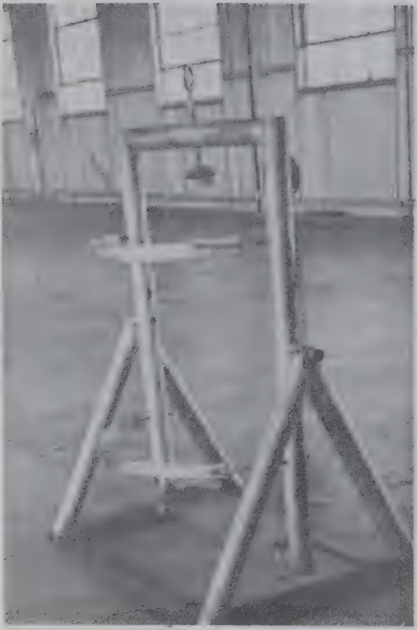
Standing, from left to right, are: Arthur Fore, Junior Inspector, Beaumont; B. J. Fisher, Junior Inspector, Orange; W. R. Tynes Jr., Junior Inspector, Orange; Leo Gunter, Chief Inspector, Beaumont; S. W. Copp, Associate Resident Engineer, Beaumont; W. N. Dudley, Resident Inspector, Beaumont; C. H. Brown, District Construction Engineer, Beaumont; D. D. Peters, Draftsman, Jasper; and Cecil Norris, Resident Designer, Beaumont.

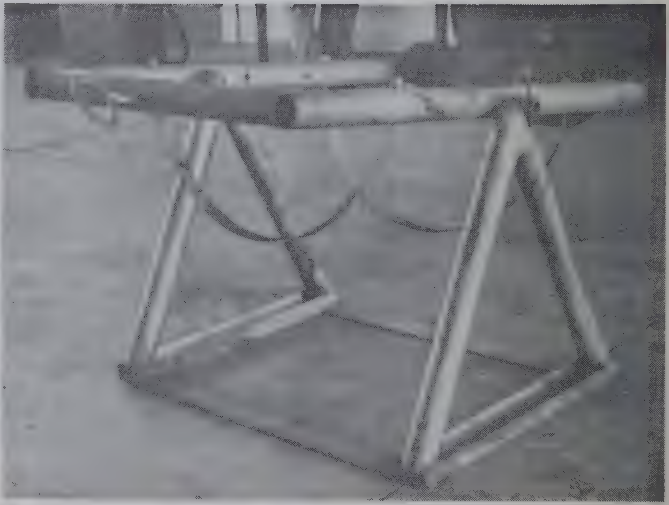
Kneeling, from left to right: H. J. Kelly, Designing Engineer, Beaumont; Leo Skipper, Senior Inspector, Anahuac; H. C. Webb, Senior Inspector, Port Arthur; and B. F. Sullivan, Senior Inspector, Port Arthur. Two students - Henry T. Smith, Chief Inspector, Anahuac, and F. K. Sewell, Rodman, Liberty, were not present for the picture.

DISTRICT 5'S TILTING OIL DRUM RACK









With a few pieces of scrap pipe, channel iron, and worn grader blades, a welding torch and an idea, Jake Webb, Senior Maintenance Foreman at Post, and some of his men made this useful rack in District 5.

At most section warehouses, it is necessary to stock several grades of motor oil and sometimes barrel pumps are not available, but with this rack and a molasses faucet, it is easy to dispense the oil.

The addition of four heavy casters would allow the rack to be more easily moved about.

Maintenance Production Report

PART II

By Merle L. Beach, Gilbert W. Gray, Philip B. Keasey,
Keith F. Kohler, and Keith P. Lautenbach

Highway Engineers, *Bureau of Public Roads*

This is the second in a series of articles taken from Report No. PS 2009 of the Production Cost Unit, Research Division, Bureau of Public Roads.

Part 4. Fill and Cut Slope Sodding Operations on U.S. 290 near Manor:

On January 22, a study was obtained of fill and cut slope sodding operations by a five-man crew on U.S. 290 near Manor. A study of the watering portion of these operations was not obtained until January 29, but the data thus obtained has been incorporated into this particular study.

The equipment used on this operation consisted of the following:

1 - Motor patrol, 20, 000 lb. class, 53 h.p.

1 - Conveyor type force feed loader

1 - Water truck with 2, 000-gallon semi-trailer tank

2 - Dump trucks, four-cubic yard

1 - Service truck

The seven men on this operation were assigned as follows:

1 - Motor patrol operator (also drove the service truck to the work site and serviced the patrol and loader)

1 - Loader operator

2 - Dump truck operators

1 - Water truck driver

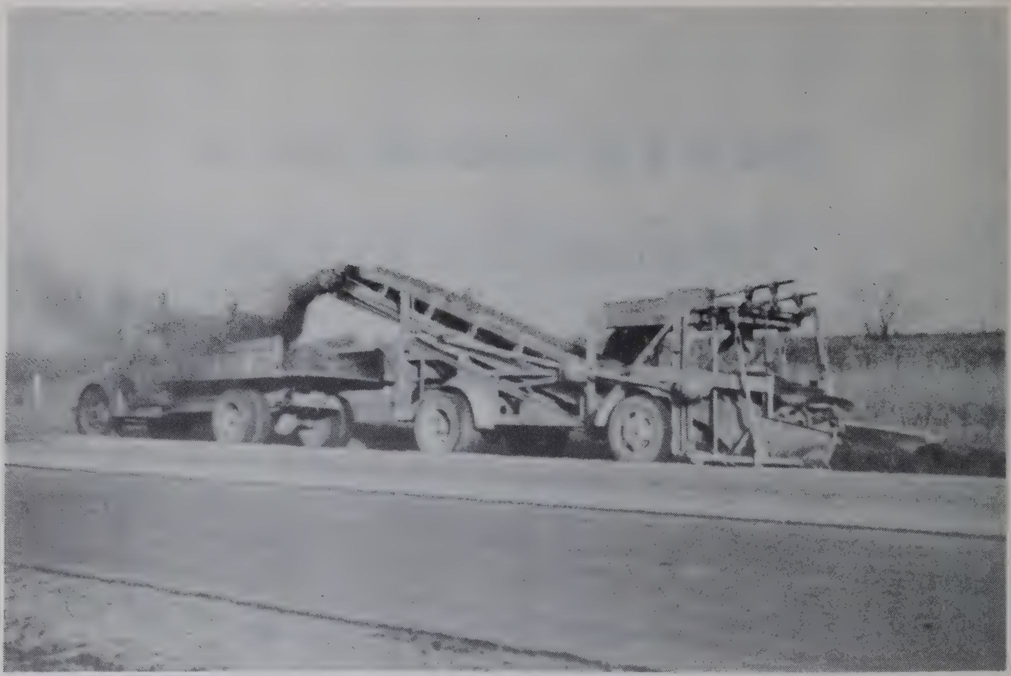
1 - Helper on water truck

1 - Laborer and spotter at the dump site

Sod for this operation was obtained from a fairly flat section of right of way, and hauled three to six miles. It was placed on major cut and fill slopes that had previously been partially sodded, but now showed evidence of erosion.

The motor patrol operator cut the sod to a depth of from one to three inches and windrowed it in a manner to facilitate loading. The shallow depth of cut by the blade in the sod left just enough roots to prevent erosion and allow the sod to grow back.

The sod was loaded into two dump trucks by the loader. A third dump truck hauling outside of the study area was also loaded, but this did not occasion any delays to the two trucks being studied.



Loading a four-cubic-yard dump truck.

The dump trucks loaded by backing and following the loader. Wind and dust hampered the truck driver's view, and the loader had an occasional delay waiting for a truck to catch up or otherwise maneuver into position. At the end of the truck haul, the truck drivers dumped their loads as directed by the spotter. The spotter also did minor hand shovel spreading of the sod.

The motor patrol could cut and windrow the sod faster than it could be loaded and hauled and thus had sufficient material windrowed by midafternoon to keep the loader and trucks busy for the remainder of the day. The patrol then moved to the dump area and spent the remainder of the day spreading the sod.

The water truck watered sodded areas completed the previous day. Water was loaded from a fire hydrant near the Austin city limits and hauled to the work site, a distance of approximately seven miles. When the slopes were sufficiently flat to be mounted by the truck, the spray bar was used. Otherwise, as was generally the case, watering was done by a one and one-half inch hose with a three-fourths inch nozzle.

The rate of application with the spray bar was 329 gallons per minute as compared to 49 gallons per minute with the hose. The rate of accomplishment with the spray bar was approximately fourteen times that of the hose as shown in the tabulation accompanying Table 10. During the early morning the driver worked alone but a helper was later assigned to assist him. The helper held the hose while the driver maneuvered the truck during the watering operation.

During the 63 man-hours studied, approximately 220 cubic yards (loose measure) of sod was hauled and spread over an area of 2,870 square yards. An area of 2,180 square yards was watered with 14,000 gallons of water.

The following tables show distribution of labor and equipment-time during a one-day study of sodding operations.

Table 6.--Distribution of 63.0 man-hours (3,780 man-minutes) of working time for the seven-man crew on sodding operations

Item	Time (Man-minutes)	Per cent of total working day
Operating cycle items on assigned task		
Cut and windrow sod (blade)	148	4
Loading sod on truck (loader and truck)	167	4
Haul sod (trucks)	338	9
Dump sod (including spotting trucks)	140	4
Spreading sod (blades)	337	9
Return for more sod (trucks)	306	8
Load water (water truck)	44	1
Haul water	101	3
Watering sod	233	6
Return for more water	84	2
	1,898	50
Related items including travel and preparatory work		
Travel to work site from yard	143	4
Travel from work site to yard	158	4
Travel to new work site	152	4
Maneuvers, minor moves ahead, turns	221	6
Loading and unloading men, tools,and equipment	29	1
Load truck for another crew	20	-
Miscellaneous	71	2
	794	21
Waits and delays		
Wait for truck to arrive (loader)	351	9
Wait for trucks to dump sod (blade)	84	2
Wait for other equipment to exchange or maneuver	39	1
Refuel on job	54	2
Return to garage to refuel (service truck)	54	2
Instructions, inspections, supervision	52	1
Excess lunch	11	-
Idle	54	1
Watching watering or riding in truck	334	9
Personal	21	1
Resting	11	-
Other	23	1
	1,088	29
Total	3,780	100

Table 7.--Distribution of 9.0 hours (541 minutes) of working time for the motor patrol on sodding operations

Item	Time (Minutes)		Per cent of total working day	
Operating cycle items on assigned task				
Blade and windrow sod	148		27	
Back up	37		7	
Maneuver	22		4	
Spread sod	49		9	
		256		47
Related items including travel and preparatory work				
Travel to work site from parking area	22		4	
Travel to new work site	63		12	
Load and unload tools and equipment	1		-	
Miscellaneous	12		2	
		98		18
Waits and delays				
Parked while operator drove service truck	52		10	
Wait for trucks to dump sod	84		15	
Refuel	5		1	
Instructions and inspection	31		6	
Excess lunch	3		1	
Personal	12		2	
		187		35
Total		541		100

Travel for the day	Miles	Average speed (Miles per hour)
Blading sod into windrows	4.3	1.7
To work site from parking area	6.7	6.3
Spreading sod	1.4	1.7
From work site to parking area	3.3	9.1
Total	15.7	

The patrol bladed sod from approximately 5,300 square yards into 9 windrows with a total length of 4,820 feet and spread sod at the dump site over an area of 2,870 square yards. The sod spread was not necessarily the same sod that was windrowed earlier that day.

Table 8.--Distribution of 9.0 hours (540 minutes) of working time for the loader on sodding operations

Item	Time (Minutes)	Per cent of total working day
Operating cycle items on assigned task		
Loading study trucks	82	15
Loading other truck	20	4
Maneuver	6	1
	108	20
Related items including travel and preparatory work		
Travel between work sites	19	4
Start, warm-up, and park loader	6	1
	25	5
Waits and delays		
Wait on job while operator travels to work	22	4
Wait for trucks to arrive	351	65
Wait for trucks to exchange or maneuver	12	2
Refuel and repair wiring	8	2
Instructions	2	-
Quit early	10	2
Idle	1	-
Traffic delay (public)	1	-
	407	75
	540	100

Travel for the day	Miles	Average speed (Miles per hour)
Loading trucks	0.63	0.4
Travel between work sites	2.5	7.9
Total	3.13	

The loader loaded 49 loads into two study trucks and 11 loads into a third truck hauling outside the study area, for a total of 60 truck loads.

Table 9.--Distribution of 18.9 equipment-hours (1,134 minutes) of working time for the two dump trucks on sodding operations

Item	Time (Truck-minutes)		Per cent of total working day	
Operating cycle items on assigned task				
Back truck while loading	84		7	
Haul	338		30	
Dump, turn, and maneuver	153		14	
Return	306		27	
		881		78
Related items including travel and preparatory work				
Travel to work site from yard	52		5	
Travel from work site to yard	37		3	
Travel to new work site	10		1	
Minor moves, turns, and maneuvers	2		-	
Load and unload men, tools, and equipment	6		-	
Miscellaneous	11		1	
		118		10
Waits and delays				
Wait for other equipment to exchange or maneuver	23		2	
Refuel on job	21		2	
Trip back to garage to refuel	54		5	
Instructions and supervision	9		1	
Idle	8		1	
Personal	3		-	
Other	17		1	
		135		12
Total		1,134		100

Travel for the day	Miles	Average speed (Miles per hour)
Haul	223.0	40
Return	213.5	42
To work site from yard	38.4	44
From work site to yard	27.5	44
To new work site	2.3	13
Total	504.7	

The two dump trucks hauled 49 loads of sod averaging 4 1/2-cubic yards (loose measure) for a total of 220 cubic yards.

Table 10.--Distribution of 9.6 hours (574 minutes) of working time of the water truck on sodding operations

Item	Time (Minutes)		Per cent of total working day	
Operating cycle items on assigned task				
Load water into truck	44		7	
Haul water	101		18	
Stopped while men water with hose	203		35	
Watering with spray bar	12		2	
Return for more water	84		15	
		444		77
Related items including travel and preparatory work				
Travel to work site from yard	13		2	
Travel from work site to yard	26		5	
Travel to new work site	12		2	
Minor moves ahead, turns, and maneuvers	32		5	
Mount and dismount	10		2	
Miscellaneous (take out, put up hose, etc.)	9		2	
		102		18
Waits and delays				
Maintenance of equipment	22		4	
Instructions and supervision	6		1	
		28		5
Total		574		100

Travel for the day	Miles	Average speed (Miles per hour)
Haul water	49.1	29
Return for more water	44.2	32
To work site from yard	6.7	30
From work site to yard	13.6	32
To new work site	3.7	19
Total	117.3	

Application of water

Item	Gallons	Square yards covered	Square yards per minute	Gallons per square yard
Watering with spray bar	4,000	1,025	85	3.9
Watering with 1 1/2-inch hose	10,000	1,155	6	8.7

Table 11.--Distribution of 9.4 hours (567 minutes) of working time for the service truck on sodding operations

Item	Time (Minutes)		Per cent of total working day	
Operating cycle items on assigned task				
Transfer gasoline to equipment	23		4	
Related items including travel and preparatory work				
Travel to work site from yard	24		4	
Travel from work site to yard	23		4	
Travel between work sites	15		3	
Maneuvers	1		-	
Load gas in service tank	5		1	
		68		12
Waits and delays				
Parked while men work	473		84	
Instructions	1		-	
Personal	1		-	
Traffic delay	1		-	
		476		84
Total		567		100

Travel for the day	Miles	Average speed (Miles per hour)
To work site from yard	12.5	32
From work site to yard	12.5	33
Between work sites	6.4	26
Total	31.4	

Part 5. Filling "dry weather" cracks along State Route 29:

On January 18, a one-day study was obtained of a five-man crew filling "dry weather" cracks along State Route 29, approximately ten miles south of Austin. These cracks were said to be caused by shrinkage of the subgrade below the bituminous treated surface. Although cracks along this particular section of highway had been filled about a month previous, certain new or deep cracks required additional attention.

The equipment used on this operation included the following:

1 - Dump truck, 4-cubic yard, pulling an asphalt 400-gallon spray unit.

1 - Dump truck, 4-cubic yard, hauling sand.

3 - Asphalt pouring pots, 2-gallon. Miscellaneous hand tools principally shovels.

Filling cracks with two-gallon pouring pots.

The retort on the spray unit had been fired by the night watchman sometime during the night, and the emulsified asphalt had reached a temperature of about 200 degrees Fahrenheit when the crew arrived at work. Emulsified asphalt was preferred for this operation because it could be poured at low temperatures and under normal conditions did not require reheating during the day. The sand had been loaded in the truck the previous day, so the crew was able to start immediately for the job.

The method of operation was to have two men filling the cracks with asphalt, a third man covering the asphalt with sand and a man driving each truck. The driver of the truck pulling the spray unit helped fill cracks between moves, and the driver of the sand truck helped cover with sand. Signs were placed on the front of each truck directing and cautioning approaching traffic.

Most of the cracks were along the edge of the pavement; so the crew worked along one side of the highway and back along the other side, every few miles. They then moved to another section and repeated the process.

The Travis County maintenance foreman made several inspections of the operation during the day and when it appeared the crew might run out of sand, he had another driver bring a truck full of sand to exchange for the truck they were using. No attempt was made to determine the time required for the other truck to load and haul the extra sand.

The crack-filling operation moved forward at a fairly continuous rate, but occasional deep cracks, which often took several gallons of asphalt, resulted in brief slowdowns.

During the 46 man-hours studied, a total of 200 gallons of emulsified asphalt was used to fill cracks along 10 lane-miles of roadway. About three and one-half cubic yards of sand were used to cover these cracks. Asphalt was poured at the average rate of 21.1 gallons per man-hour of actual pouring time. The pouring pots were filled 177 times for an average load of 1.1 gallons.

The following tables show distribution of labor and equipment time during a one-day study of crack-filling operations.

Table 12.--Distribution of 46.0 man-hours (2,758 man-minutes) of working time for the five-man crew on crack-filling operations

Item	Time (Man-minutes)	Per cent of total working day
Operating cycle items on assigned task		
Move truck ahead (spray unit)	275	10
Filling pots	31	1
Walking between cracks or to fill pots	686	25
Pouring asphalt in cracks	568	21
Spreading sand on asphalt	264	10
Moving sand truck backwards between cracks	312	11
	2,136	78
Related items including travel and preparatory work		
Travel to work site from yard	85	3
Travel from work site to yard	64	2
Travel to new work sites	24	1
Mount and remove signs on trucks	22	1
Load and unload men, tools, and equipment	27	1
Miscellaneous	11	-
	233	8
Waits and delays		
Wait for cracks to be filled	229	8
Wait on other operations	57	2
Maintenance of pouring pots	16	1
Instructions, inspection, and supervision	21	1
Excess lunch	17	1
Idle	10	-
Personal	29	1
Resting	3	-
Clean spilled oil from highway	7	-
	389	14
Total	2,758	100

Table 13.--Distribution of 9.2 hours (554 minutes) of working time for the dump truck pulling an asphalt spray unit on crack-filling operations

Item	Time (Minutes)		Per cent of total working day	
Operating cycle items on assigned task				
Pulling spray unit during crack filling	276		50	
Stopped while men fill pots	31		6	
		307		56
Related items including travel and preparatory work				
Travel to work site from yard	18		3	
Travel from work site to yard	14		3	
Travel to new work sites	5		1	
Mount and remove sign on truck	9		2	
Load and unload men, tools, and equipment	14		2	
		60		11
Waits and delays				
Wait during heating of oil	6		1	
Stopped while men fill cracks	178		32	
Instructions	1		-	
Excess lunch	2		-	
		187		33
Total		554		100

Travel for the day	Miles	Average speed (Miles per hour)
To work site from yard	8.9	30
From work site to yard	8.2	35
To new work sites	2.7	35
Pulling spray unit between cracks	10.0	2
Total	29.8	

Table 14.--Distribution of 9.2 hours (552 minutes) of working time for the dump truck hauling sand on crack-filling operations

Item	Time (Minutes)	Per cent of total working day
Operating cycle items on assigned task		
Travel (backing) during crack filling	313	57
Stopped while men shovel sand	79	15
	392	72
Related items including travel and preparatory work		
Travel to work site from yard	17	3
Travel from work site to yard	12	2
Travel to new work site	5	1
Put on and remove signs on truck	12	2
Load and unload men, tools, and equipment	11	2
Raise and lower bed	2	-
	59	10
Waits and delays		
Wait for cracks to be filled	94	17
Instructions	2	-
Excess lunch	5	1
	101	18
Total	552	100

Travel for the day	Miles	Average speed (Miles per hour)
To work site from yard	9.1	32
From work site to yard	8.2	42
To new work site	2.7	34
Travel backwards while men shovel sand	10.0	2
Total	30.0	

"Comments From the Traveling Public"

OVER THE HIGHWAYS

. . . We like your engineering of highways to avoid city traffic, and the genuine courtesy of all with whom we came in contact. Your greeters at borders are a wonderful idea.

Mr. H. E. Park
Adelanto, California

. . . Beer cans and bottles were all along your fine highways, also old tires lying along the roads. We were impressed with your good highways with such a large mileage to care for, and with the friendly reception we received at the state line.

Paul C. Schmidt
East Palestine, Ohio

. . . You have inadequate highway markings on signs. One or two town names would be very helpful, such as California uses.

Hyder A. Clark
Los Angeles, California

. . . I do want to thank you folks for the kindness shown my mother and dad while driving through your state. If the highway departments of other states were as kind and courteous as you folks were, it would make older folks enjoy their trips more. Thanks again.

Mrs. H. W. Cline
Long Beach, California

. . . We don't like the inconveniences we have to go through in order to obtain a permit to move a house trailer. The information office (El Paso) should issue them.

Waukegan, Illinois

. . . There were trash, bottles, and cans along the highways, especially in western Texas.

Canton, Missouri

I could not resist the impulse to write this letter and say "thank you" and to let you know how proud my family and I are of Texas, the comforts and privileges we enjoy as a result of the work you and your department conduct.

Just recently we returned home after a vacation trip to an adjoining state. We especially like to have picnics outdoors and cook meals out. We drove completely across our neighbor state without once spotting a roadside park, and even in the city parks we could not find very suitable accommodations for folks like us who enjoy "roughing it" occasionally.

Then, on our way home, after we had driven across the State Line into our beloved Texas, we spotted one right after another of the most beautiful and well-kept roadside parks we have ever seen, nestled in tall pines and just begging someone to come and enjoy the peace and quiet they had to offer.

I just wanted you to know that we all swelled with pride, as Texans are supposed to do, because we felt our State really had something of value to offer tourists.

It is good of you to bear with me while I brag on Texas, because this is only one of Texas' features of which we are proud -- really, I could go on and on, but not this time.

Mrs. Paul M. Quillin
Fort Worth, Texas

The Highway Department's road grader or blade that has been scraping and cleaning out the ditches and borrow pits along state highways in this end of --- County this summer and fall is leaving a very unsightly appearance along the highways. They are rolling up and piling up dirt and clods and grass and debris as far as the fence lines, which is not only rugged and unsightly, but will make mowing in the spring next to impossible. Evidently, this work is being done without supervision, as the engineer in charge of this division could not escape seeing this. I know the Highway Department is spending thousands of dollars every year to beautify the highways and such work as above cited being done by the same department is not consistent. I know it is necessary to keep these ditches cleared in order to afford proper drainage, but it would seem that the work should be followed up and left in a workmanlike appearance.

I know from personal experience that if I were a contractor doing this work, the Highway Department would not accept and pay me for same until I had completed it in a neat and workmanlike manner.

This letter is not written in criticism of your local supervisor as I am certain he is doing the best he can with what equipment and funds he has at his disposal, but I am merely calling your attention to the matter for your consideration.

(Signed)

. . . We were impressed with the plentiful state and roadside parks, with good facilities . . .

T. S. Spicer
State College, Pennsylvania

. . . There was a lack of shade at roadside parks . . .

Mr. and Mrs. C. G. Hoeltzel
Little Rock, Arkansas

. . . Your roadside parks for resting and eating lunches are very clean and nice . . .

Theo C. Niebus
Lake Katrine, New York

. . . Vandalism at roadside parks was very bad . . .

F. C. Sorrels
Texarkana, Arkansas

. . . You have well appointed roadside parks. Best equipment I have seen . . .

Tacoma, Washington

. . . We were impressed with the lovely roadside parks . . .

Long Beach, California

. . . There were not enough nice roadside picnic tables for tourists . . .

Virginia Beach, Virginia

. . . We liked your small roadside parks--you can't know how much they are appreciated . . .

San Francisco, California

IN MEMORIAM

Frank E. Ames, maintenance employee of District 1, died on November 12, from injuries received when he fell from a bridge scaffold on Highway 34, south of Greenville, on October 28.